west virginia department of environmental protection

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GENERAL PERMIT REGISTRATION APPLICATION ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Registration No.:	G60-C079		
Plant ID No.:	045-00149		
Applicant:	Greenbrier Minerals, LLC		
Facility Name:	Toney Fork Surface Mine		
Location:	Saunders, Logan County		
SIC Code:	1221 (Bituminous Coal & Lignite - Surface)		
NAICS Code:	212111 (Bituminous Coal and Lignite Surface Mining)		
Application Type:	Construction		
Received Date:	August 28, 2015		
Engineer Assigned:	Dan Roberts		
Fee Amount:	$1,500.00		
Date Received:	September 1, 2015		
Applicant Ad Date:	September 2, 2015		
Newspaper:	*The Logan Banner*		
Complete Date:	February 10, 2017		
UTM's:	Easting: 437.43091 km	Northing: 4185.13703 km	NAD83 Zone 17N
Lat/Lon Coordinates:	Latitude: 37.811484	Longitude: -81.710833	NAD83
Description:	Application for the construction of one (1) emergency generator and one (1) diesel storage tank for the purpose of providing back-up electrical power for critical operating functions. The emergency generator Gen Set-1 will be a 2007 Caterpillar model 3512B and operated no more than 500 hours per year.		

BACKGROUND

Greenbrier Minerals, LLC's proposed emergency generator (G60-C079) and existing raw coal screening plant (G10-D164) meet the definition of "Building, Structure, Facility, or Installation" in 45CSR14.2.10 and "Major Source" in 45CSR30.2.26 and shall be considered as one facility for determining applicability to 45CSR14 (PSD) and 45CSR30 (Title V). Therefore, Greenbrier Minerals, LLC's proposed emergency generator and existing raw coal screening plant shall be combined when determining applicability and share the common facility ID Number of 045-00149.

PROCESS DESCRIPTION

Greenbrier Minerals, LLC proposes to install an emergency generator (Gen Set-1) powered by a diesel-fired Caterpillar 3512B for the purpose of producing emergency electrical power at the Toney Fork Surface Mine located near Saunders, Logan County, WV. The Caterpillar 3512B is a V12 water cooled 4 stroke with a manufacturer's rating of 2,000 bhp at 1,800 rpm and uses approximately 108.6 gallons of diesel per hour.

Reciprocating Internal Combustion Engines

Emission Unit ID No.	Emission Unit Description (Make, Model, Serial No., etc.)	Year Manufactured/ Reconstructed	Year Installed/ Modified	Design Capacity (Bhp/rpm)
Gen Set-1	Caterpillar 3512B, #2FO / 108.6 gph	2007	2015	2,000 / 1,800

Reciprocating Internal Combustion Engines (R.I.C.E.) Information

Emission Unit ID No.	Subject to 40CFR60 Subpart IIII?	Subject to 40CFR60 Subpart JJJJ?	Subject to Sections 9.1.4/9.2.1 (Catalytic Reduction Device)
Gen Set-1	Yes	No	No

Storage Tanks

Source ID No.	Status	Content	Design Capacity			Orientation	G10-D Applicable Sections
			Volume	Diameter	Throughput		
T1	New	Diesel	1,000	4	60,000	HORZ	10

SITE INSPECTION

This is an application for one (1) emergency generator and one (1) diesel storage tank installed for the purpose of allowing key systems to continue to operate without interruption during times of utility power outages. A site inspection was deemed unnecessary by the writer at this time.

Directions: Take US-119 South and travel 52.8 miles, take the WV-73 ramp toward WV-10/Logan and travel 0.3 miles, turn left onto WV-73 and travel 2.3 miles, turn left onto Old Highway 119 and travel 0.6 miles, stay straight to go onto WV-10/Logan Blvd. And continue 8.9 miles, turn left to stay on WV-10 and travel 5.2 miles, make a U-turn at State Route 80 onto WV-10 and travel 0.9 miles, take the first right onto Bridge Street and travel 0.2 miles, turn left onto Main Street/County Highway-16 and continue to follow County Highway-16 for 1.8 miles, turn left onto County Highway 16/Buffalo Creek Road and travel 9.7 miles, turn left onto County Route 16-3/Toney Fork Road and follow it to the facility.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emission calculations were calculated by the applicant's consultant and checked for accuracy and completeness by the writer. The calculated engine emissions included in the application were found to be overstated, as the calculations for NOx, CO and PM were based on AP-42 emission factors instead of Manufacturers Data or EPA's Certificate of Conformity. Therefore, the writer used the website https://www.epa.gov/compliance-and-fuel-economy-data/engine-certification-data#large to find information on the 2007 Caterpillar, Inc. Model 3512B Generator to be from Engine Family 7CPXL58.6T2E and Certificate # CPX-NRCI-07-13 with Certification Levels for NO_X as 5.32 g/kW-hr, CO as 1.61 g/kW-hr and PM as 0.136 g/kW-hr. A copy has been attached. These levels are less than the EPA Standards for a 2007 Tier 2 emergency generator >900 kW, which are NO_X as 6.4 g/kW-hr, CO as 3.5 g/kW-hr and PM as 0.20 g/kW-hr. Therefore, emergency generator Gen Set-1 should be in compliance with its maximum potential emission limits.

Emission estimates for hazardous and toxic pollutants were determined using emission factors from AP-42, Section 3.4, Table 3.4-3 . Estimated diesel heat input is 19,300 Btu/lb times 7.1 lb/gal times 108.6 gal/hour, which equals 14.88 MMBtu/hr.

Refer to the table below for details and how the writer calculated the hourly and annual emission limitations for the emergency generator.

Hourly and Annual Emission Calculations for Greenbrier Minerals, LLC's Emergency Generator Gen Set-1 (2007 Caterpillar 3512B)

Pollutant	Emission Factor			Engine Emissions		
	Factor	Units	Source	lb/hr	Limited [1] TPY	Max. [2] TPY
NO_X	5.32	g/kW-hr	2007 EPA Tier 2 Exhaust Emission Compliance Statement [4]	17.52	4.38	76.72
CO	1.61	g/kW-hr		5.30	1.33	23.22
VOC	0.000705	lb/hp-hr	AP-42 Table 3.4-1	1.41	0.35	6.18
PM	0.136	g/kW-hr	2007 EPA Tier 2 Exhaust Emission Compliance Statement [4]	0.45	0.11	1.96
SO_X	0.00001 [5]	lb/hp-hr	AP-42 Table 3.4-1	0.02	< 0.01	0.11
Total HAPs [3]	various	lb/MM Btu	AP-42, Table 3.4-3	0.06	0.02	0.27

(1) Based on operating the generator 500 hr/yr.
(2) Based on operating the generator 8,760 hr/yr.
(3) Greenbrier Minerals, LLC used a diesel fuel consumption rate of 108.6 gal/hr and a fuel Btu value of 136,600 Btu/gal.
(4) The engine is EPA Tier 2 certified: EPA Certificate Number - CPX-NRCI-07-13; EPA Engine Family - 7CPXL58.6T2E.
(5) Where $SO_X = 0.00809 * S_1$ where S1 equals the % sulfur in fuel oil (15 ppm)

Greenbrier Minerals, LLC's proposed emergency generator (G60-C079) and existing raw coal screening plant (G10-D164) meet the definition of "Building, Structure, Facility, or Installation" in 45CSR14.2.10 and "Major Source" in 45CSR30.2.26 and shall be considered as one facility for determining applicability to 45CSR14 (PSD) and 45CSR30 (Title V). Therefore, Greenbrier Minerals, LLC's proposed emergency generator and existing raw coal screening plant shall be combined when determining applicability and share the common facility ID Number of 045-00149.

The proposed emergency generator (G60-C079) and existing raw coal screening plant (G10-D164) will have a combined estimated potential to discharge controlled emissions of 547.52 TPY of particulate matter (PM), of which 171.55 TPY will be particulate matter less than 10 microns in diameter (PM_{10}). The proposed emergency generator and existing raw coal screening plant will have a combined estimated potential to emit (open storage piles constructed or modified after May 27, 2009 and point sources combined) of 72.50 TPY of PM, of which 34.23 TPY will be PM_{10}. Refer to the following table for a complete summary of Greenbrier Minerals, LLC's proposed emergency generator and existing raw coal screening plant's combined potential to discharge:

- Combined Emissions Totals - **Greenbrier Minerals, LLC**	**Controlled PM Emissions**		**Controlled PM_{10} Emissions**	
	lb/hour	TPY	lb/hour	TPY
Fugitive Emissions				
G60-C079 - Emergency Generator	0.00	0.00	0.00	0.00
G10-D164 - Raw Coal Screening Plant	108.18	475.02	31.27	137.32
Fugitive Emissions Total	*108.18*	*475.02*	*31.27*	*137.32*
Point Source Emissions				
G60-C079 - Emergency Generator	0.45	0.11	0.45	0.11
G10-D164 - Raw Coal Screening Plant	16.75	72.39	8.02	34.12
Point Source Emissions Total	*17.20*	*72.50*	*8.47*	*34.23*
COMBINED EMISSIONS TOTAL	**125.38**	**547.52**	**39.74**	**171.55**

The maximum permitted emission rates for Gen Set-1 (G60-C079) and Engine E1 (G10-D164) shall not exceed the following based on a maximum of 500 hours of operation per year:

Pollutant	**Gen Set-1 - G60-C079**		**Engine E1 - G10-D164**		***Combined Emissions***	
	Hourly Emissions lb/hour	**Annual Emissions TPY**	**Hourly Emissions lb/hour**	**Annual Emissions TPY**	***Hourly Emissions lb/hour***	***Annual Emissions TPY***
NO_X	17.52	4.38	3.44	0.86	*20.96*	*5.24*
CO	5.30	1.33	0.74	0.19	*6.04*	*1.52*
VOC	1.41	0.35	0.27	0.07	*1.68*	*0.42*
SO_2	0.02	0.01	0.23	0.06	*0.25*	*0.07*
PM_{10}	0.45	0.11	0.24	0.06	*0.69*	*0.17*
Total HAP	0.06	0.02	0.01	< 0.01	*0.07*	*0.02*

REGULATORY APPLICABILITY

NESHAPS and PSD have no applicability to the modified facility. The construction of Greenbrier Minerals, LLC's proposed emergency generator Gen Set-1 is subject to the following state and federal rules:

45CSR13 *Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Temporary Permits, General Permits, and Procedures for Evaluation*

The proposed construction of this emergency generator Gen Set-1 is subject to the requirements of 45CSR13 because it involves the construction of one (1) diesel fired emergency generator, which is subject to 40 CFR 60 NSPS Subpart IIII. The applicant has submitted an application for a modification registration. The applicant published a Class I legal advertisement in the *Logan Banner* on September 2, 2015 and submitted $500 for the General Permit application fee and $1,000 for the NSPS fee.

45CSR16 *Standards of Performance for New Stationary Sources*
40 CFR 60 *Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines*

The provisions of Subpart IIII are applicable to owners and operators of stationary compression ignition (CI) internal combustion engines (ICE) which commence construction after July 11, 2005 and are manufactured after April 1, 2006. For the purposes of Subpart IIII, the date that construction commences is the date the engine is ordered by the owner or operator.

Generator Gen Set-1 is a 2007 Caterpillar model 3512B generator rated for 2,000 hp (1,500 kW). Generator Gen Set-1 is a V12 water cooled four stroke diesel and is EPA Tier 2 Certified. In accordance with § 60.4200 (2), this engine is subject to Subpart IIII because it commenced construction after July 11, 2005 and was manufactured after April 1, 2006.

In accordance with § 60.4207(b), "Beginning October 1, 2010, owners and operators of stationary CI ICE subject to this subpart with a displacement of less than 30 liters per cylinder that use diesel fuel must use diesel fuel that meets the requirements of 40 CFR 80.510(b) for nonroad diesel fuel."

40 CFR 89 *Control of Emissions From New and In-use Nonroad Compression-Ignition Engines*

This part applies to all compression-ignition nonroad engines except those specified in paragraph (b) of this section. This means that the engines for which this part applies include but are not limited to compression-ignition engines exempted from the requirements of 40 CFR Part 92 by 40 CFR 92.207 or 40 CFR Part 94 by 40 CFR 94.907. This part applies as specified in 40 CFR part 60 subpart IIII, to compression-ignition engines subject to the

standards of 40 CFR part 60, subpart IIII.

40 CFR 63 *Subpart ZZZZ: National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*

According to the RICE NESHAP Summary of Requirements, new and reconstructed stationary compression ignition engines constructed on or after June 12, 2006 and located at an area source of HAP are subject to 40 CFR 60 Subpart ZZZZ - National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines, however, the only requirements that apply are those required under 40 CFR 60, Subpart IIII because the facility will not be a major source of HAP.

45CSR30 *Requirements for Operating Permits*

In accordance with 45CSR30 Major Source Determination, the proposed emergency generator (G60-C079) and existing raw coal screening plant (G10-D164) are not listed in 45CSR30 subsection 2.26.b as one of the categories of stationary sources which must include fugitive emissions (open storage piles constructed or modified on or before May 27, 2009 and haulroads) when determining whether it is a major stationary source for the purposes of § 302(j) of the Clean Air Act. The proposed emergency generator (G60-C079) and existing raw coal screening plant's (G10-D164) *combined* potential to emit will be 34.32 TPY for PM_{10} (open storage piles constructed or modified after May 27, 2009 and point sources combined), which is less than the 45CSR30 threshold of 100 TPY of a regulated air pollutant used to define a major stationary source. Therefore, the proposed emergency generator (G60-C079) and existing raw coal screening plant (G10-D164) will be a nonmajor source subject to 45CSR30. The proposed emergency generator (G60-C079) and existing raw coal screening plant (G10-D164) will not subject to the permitting requirements of 45CSR30 and will be classified as a deferred source.

The proposed construction of Greenbrier Minerals, LLC's emergency generator is <u>not</u> subject to the following state and federal rules:

45CSR14 *Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration*

In accordance with 45CSR14 Major Source Determination, the proposed emergency generator (G60-C079) and existing raw coal screening plant (G10-D164) are not one of the 100 TPY stationary sources listed under the definition of "Major Stationary Source" in subsection 2.43.a. Therefore, it must have the potential to emit 250 TPY or more of any regulated pollutant to meet the definition of a major source in subsection 2.43.b. At the end of subsection 2.4.3, this facility is not listed in Table 1 - Source Categories Which Must Include Fugitive Emissions. So, fugitive emissions (from open storage piles constructed or modified on or before May 27, 2009 and haulroads) are not included when determining major stationary source applicability. The proposed emergency generator and existing raw coal screening plant's *combined* potential to emit will be 72.69 TPY for PM (open storage piles constructed or modified after May 27, 2009 and point sources combined), which is less

than the 45CSR14 threshold of 250 TPY for a regulated air pollutant used to define a major stationary source. Therefore, the proposed emergency generator and existing raw coal screening plant are not subject to the requirements set forth within 45CSR14.

45CSR16 *Standards of Performance for New Stationary Sources*

40 CFR 60 *Subpart Kb: Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984*

The proposed storage tank T1 will not be subject to 40 CFR 60 Subpart Kb. Subpart Kb applies to each storage vessel with a capacity greater than or equal to 75 cubic meters (m^3) (19,813 gallons) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification commenced after July 23, 1984. The application indicates that tanks T1 will have a maximum capacity of 3.78 cubic meters (m^3) (1,000 gallons), and therefore will be exempt from the General Provisions (part 60, subpart A) and from the provisions of Subpart Kb.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

A toxicity analysis was not performed because the primary pollutants that will be emitted from this facility are PM (particulate matter) and PM_{10} (particulate matter less than 10 microns in diameter), which are non-toxic pollutants.

Small amounts of non-criteria regulated hazardous or toxic air pollutants such as benzene, ethylbenzene, toluene, xylenes and formaldehyde may be emitted when fuels are combusted in reciprocating internal combustion engines. Due to the typically small amounts emitted, these non-criteria regulated hazardous/toxic pollutants should not adversely impact an applicable ambient air quality standard or cause or contribute to degradation of public health and welfare.

Acetaldehyde:
Acetaldehyde is mainly used as an intermediate in the synthesis of other chemicals. It is ubiquitous in the environment and may be formed in the body from the breakdown of ethanol. Acute (short-term) exposure to acetaldehyde results in effects including irritation of the eyes, skin, and respiratory tract. Symptoms of chronic (long-term) intoxication of acetaldehyde resemble those of alcoholism. Acetaldehyde is considered a probable human carcinogen (Group B2) based on inadequate human cancer studies and animal studies that have shown nasal tumors in rats and laryngeal tumors in hamsters.

Acrolein:
Acrolein is primarily used as an intermediate in the synthesis of acrylic acid and as a biocide. It may be formed from the breakdown of certain pollutants in outdoor air or from the burning of organic matter including tobacco, or fuels such as gasoline or oil. It is toxic to humans following inhalation, oral or dermal exposures. Acute (short-term) inhalation exposure may result in upper respiratory tract irritation and congestion. No information is available on its reproductive, developmental, or

carcinogenic effects in humans, and the existing animal cancer data are considered inadequate to make a determination that acrolein is carcinogenic to humans.

Benzene:
Benzene is found in the air from emissions from burning coal and oil, gasoline service stations, and motor vehicle exhaust. Acute (short-term) inhalation exposure of humans to benzene may cause drowsiness, dizziness, headaches, as well as eye, skin, and respiratory tract irritation, and, at high levels, unconsciousness. Chronic (long-term) inhalation exposure has caused various disorders in the blood, including reduced numbers of red blood cells and aplastic anemia, in occupational settings. Reproductive effects have been reported for women exposed by inhalation to high levels, and adverse effects on the developing fetus have been observed in animal tests. Increased incidence of leukemia (cancer of the tissues that form white blood cells) have been observed in humans occupationally exposed to benzene. EPA has classified benzene as a Group A, human carcinogen.

Formaldehyde:
Formaldehyde is used mainly to produce resins used in particle board products and as an intermediate in the synthesis of other chemicals. Exposure to formaldehyde may occur by breathing contaminated indoor air, tobacco smoke, or ambient urban air. Acute (short-term) and chronic (long-term) inhalation exposure to formaldehyde in humans can result in respiratory symptoms, and eye, nose, and throat irritation. Limited human studies have reported an association between formaldehyde exposure and lung and nasopharyngeal cancer. Animal inhalation studies have reported an increased incidence of nasal squamous cell cancer. EPA considers formaldehyde a probable human carcinogen (Group B1).

Naphthalene:
Naphthalene is used in the production of phthalic anhydride; it is also used in mothballs. Acute (short-term) exposure of humans to naphthalene by inhalation, ingestion, and dermal contact is associated with hemolytic anemia, damage to the liver, and neurological damage. Cataracts have also been reported in workers acutely exposed to naphthalene by inhalation and ingestion. Chronic (long-term) exposure of workers and rodents to naphthalene has been reported to cause cataracts and damage to the retina. Hemolytic anemia has been reported in infants born to mothers who "sniffed" and ingested naphthalene (as mothballs) during pregnancy. Available data are inadequate to establish a causal relationship between exposure to naphthalene and cancer in humans. EPA has classified naphthalene as a Group C, possible human carcinogen.

Toluene:
The acute toxicity of toluene is low. Toluene may cause eye, skin, and respiratory tract irritation. Short-term exposure to high concentrations of toluene (e.g., 600 ppm) may produce fatigue, dizziness, headaches, loss of coordination, nausea, and stupor; 10,000 ppm may cause death from respiratory failure. Ingestion of toluene may cause nausea and vomiting and central nervous system depression. `Contact of liquid toluene with the eyes causes temporary irritation. Toluene is a skin irritant and may cause redness and pain when trapped beneath clothing or shoes; prolonged or repeated contact with toluene may result in dry and cracked skin. Because of its odor and irritant effects, toluene is regarded as having good warning properties. The chronic effects of exposure to toluene are much less severe than those of benzene. No carcinogenic effects were reported in animal studies. Equivocal results were obtained in studies to determine developmental effects in animals.

Toluene was not observed to be mutagenic in standard studies.

Xylene:
Commercial or mixed xylene usually contains about 40-65% m-xylene and up to 20% each of o-xylene and p-xylene and ethyl benzene. Xylenes are released into the atmosphere as fugitive emissions from industrial sources, from auto exhaust, and through volatilization from their use as solvents. Acute (short-term) inhalation exposure to mixed xylenes in humans results in irritation of the eyes, nose, and throat, gastrointestinal effects, eye irritation, and neurological effects. Chronic (long-term) inhalation exposure of humans to mixed xylenes results primarily in central nervous system (CNS) effects, such as headache, dizziness, fatigue, tremors, and incoordination; respiratory, cardiovascular, and kidney effects have also been reported. EPA has classified mixed xylenes as a Group D, not classifiable as to human carcinogenicity.

AIR QUALITY IMPACT ANALYSIS

Air dispersion modeling was not performed due to the size and location of this facility and the extent of the proposed modification. This facility will be located in Logan County, WV, which is currently in attainment for PM (particulate matter) and PM_{10} (particulate matter less than 10 microns in diameter). This modified facility will remain a minor source as defined by 45CSR14, therefore, an air quality impact analysis is not required.

GENERAL PERMIT ELIGIBILITY

The requirements and conditions of the G60-C general permit address the prevention and control of regulated pollutant emissions from emergency generators, including emergency generators installed at Title V (major) facilities and other facilities having additional point sources of emissions. The G60-C Emergency Generator General Permit benefits the regulated community by incorporating all air quality regulations into a single general permit. General Permit G60-C was issued May 21, 2009.

The proposed emergency generator is eligible for a G60-C General Permit registration, i.e., it does meet the five (5) conditions given in 2.31 of G60-C and given below:

a. The emergency generator(s) is not a major source as defined in 45CSR14, 45CSR19 or 45CSR30;
b. The emergency generator(s) is not subject to 45CSR14, 45CSR15, 45CSR19, 45CSR25, 45CSR 27, or 45CSR34;
c. Each emergency generator is to be operated 500 hours per year or less;
d. The emergency generator(s) is not located in, nor will it (they) significantly impact, an area which has been determined to be a nonattainment area;
e. The emergency generator(s) does not require an individual air quality permit review process and/or individual permit provisions to address the emission of a regulated pollutant or to incorporate regulatory requirements other than those established by General Permit G60-C.

RECOMMENDATION TO DIRECTOR

The information contained in this general permit registration application indicates that compliance with all applicable regulations should be achieved. Due to the location and nature of the process, adverse impacts on the surrounding area should be minimized. No comments were received during the comment period. Therefore, the granting of a General Permit G60-C registration to Greenbrier Minerals, LLC for the construction of their proposed emergency generator to be located near Lorado, Logan County, WV is hereby recommended.

Daniel P. Roberts, Engineer Trainee
NSR Permitting Section

March 3, 2017
Date

GREENBRIER MINERALS - Toney Fork
EMERGENCY GENERATOR

G60-C079

Dan Roberts
3/2/2017

Gen Set - 1: 2007 Caterpillar 3512B

Tier 2

		Diesel Fu	136600 BTU/gallon
	2000 hp	Max Hea	14.835 MMBtu/hr
	1491 kW		500 hours/year
	108.6 gallons/hour		453 grams/lb
	54300 gallons/year		

8,760 hr/year

	Source	g/kW-hr	lb/hp-hr	lb/hour	TPY	TPY
NOx	Cert. Levels	5.32		17.515	4.3787	76.715232
VOC	AP42		0.000705	1.41	0.3525	6.1758
CO	Cert. Levels	1.61		5.3006	1.3251	23.216452
PM	Cert. Levels	0.136		0.4477	0.1119	1.9611413
SOx	AP42		0.00001	0.0243	0.0061	0.1063026

AP42 Table 3.4-1 for Diesel Fuel

* where SOx = 0.00809*(15 ppm/10,000) for lb/hp-hr

HAZARDOUS AIR POLLUTANTS

AP-42 5th Edition Section 3.4 Large Stationary Diesel (10/96) - Table 3.4-3
45CSR30 Table 45-30A Hazardous Air Pollutants Large > 600 hp

Caterpillar C9 Diesel Fuel Engine	**2000**	**hp**
Maximum Hours of Operation	**500**	**hours/year**
cation, based on EPA WebFIRE/AP-42 3.4-1 assumptions on diesel	**19300**	**Btu/lb**
	7.1	**lb/gal**
Heating Value for diesel	**134900**	**BTU/US gal**
Maximum diesel usage at 1800 rpm	**108.6**	**gal/hour**

E (hourly) = Emission Factor (lb/hp-hr) * Horse Power (hp)
E (annual) = Emission Factor (lb/hp-hr) * Horse Power (hp) * Maximum Hours of Operation * 1 ton per 2000 lb

CAS NO.		Emission Factor (lb/MMBtu)	Rating	lb/hour	TPY	8,760 hr/yr TPY
71-43-2	Benzene	0.000776	E	0.0114	0.002842	0.04979
108-88-3	Toluene	0.000281	E	0.0041	0.001029	0.01803
	Xylenes	0.000193	E	0.0028	0.000707	0.01238
	Propylene	0.00279	E	0.0409	0.010218	0.17903
50-00-0	Formaldehyde	0.0000789	E	0.0012	0.000289	0.00506
	Acetaldehyde	0.0000252	E	0.0004	9.23E-05	0.00162
	Acrolein	0.00000788	E	0.0001	2.89E-05	0.00051
91-20-3	Naphthalene	0.00013	E	0.0019	0.000476	0.00834
	Burning diesel fuel:		***Total HAPs***	**0.0627 lb/hour**	**0.015683 TPY**	**0.27476 TPY**

GREENBRIER MINERALS - Toney Fork **Dan Roberts**
EMERGENCY GENERATOR **G60-C079** **12/22/2016**

CRITERIA POLLUTANTS

AP-42 5th Edition Section 3.4 Large Stationary Diesel Engines (10/96) - Tables 3.4-1 and 3.4-2 for Large > 600 hp Diesel Fuel

	1492	**kW**
Caterpillar C9 Diesel Fuel Engine	**2000**	**hp**
Max. Hours of Operation (5 hrs/day, 5 days/week, 20 weeks/year)	**500**	**hrs/year**
Heating Value for diesel	**19300**	**Btu/gal**
	7.1	**gal/lb**
	108.6	**gal/hr**

E (hourly) = Emission Factor (lb/hp-hr) * Horse Power (hp)
E (annual) = Emission Factor (lb/hp-hr) * Horse Power (hp) * Maximum Hours of Operation * 1 ton per 2000 lb

Pollutant		Emission Factor (lb/hp-hr)	Emission Factor (lb/MMBtu)	Rating	***hp*** lb/hour	***hp*** TPY	***heat input*** lb/hour	***heat input*** TPY
NOx	AP42	0.02400	3.2	B	48.0000	12.000	*47.6207*	*11.91*
CO	AP42	0.00550	0.85	C	11.0000	2.750	*12.6492*	*3.162*
SOx (see below)	AP42	0.00001	0.001515	B	0.0243	0.006	*0.02255*	*0.006*
PM	AP42	0.00070	0.06970	B	1.4000	0.350	*1.03724*	*0.259*
PM10	AP42	-----	0.05730	B	-----	-----	*0.85271*	*0.213*
TOC	AP42	0.00071	0.09	C	1.4100	0.353	*1.33933*	*0.335*

SOx AP42 0.00809 * S1 where S1 =15 ppm (0.0015%)
0.00001

1.01 * S1 where S1 =15 ppm (0.0015%)
0.001515

ultra-low-sulfur diesel (ULSD) is 15 ppm
1 ppm = 0.0001%